

Joshua Lederberg; Pioneer of Molecular Biology

By PATRICIA SULLIVAN
Washington Post Staff Writer

Joshua Lederberg, 82, a Nobel Prize winner for his work in bacterial genetics who is known as one of the founders of molecular biology, a discipline that in the past half-century has begun unlocking the secrets of how organisms live and reproduce, died Feb. 2 of pneumonia at New York-Presbyterian Hospital in New York.

Dr. Lederberg's pioneering work on genetic recombination in bacteria helped propel the field of molecular genetics into the forefront of biological and medical research. His discoveries, beginning when he was 21 years old and through the award of the Nobel when he was 33, helped lay the groundwork for genetic engineering, modern biotechnology and genetic approaches to medicine.

For the next 45 years, Dr. Lederberg was acknowledged as one of the leaders in American science. He advised top government policymakers on science, lectured widely, ran a university and was a consultant to NASA on the Viking space missions to Mars. He warned of the danger of bioterrorism in 1999, urged worldwide reduction of nuclear arms stockpiles in 1991 and expressed concern over the possible contamination of life on other planets by microbes carried by spacecraft from Earth.

As recently as 2003, he served on a non-partisan research group that concluded that

government agencies across the nation were dramatically under-funding efforts to prepare police, fire and ambulance personnel for terrorist attacks.

Interdisciplinary in his methods and interests, Dr. Lederberg helped introduce computers and artificial intelligence into laboratory research and biomedical communication. He foresaw that advances in the treatment of cancer, organ transplants and geriatric medicine could present new problems, such as the availability and allocation of expensive health-care resources. Through his career, he kept doing basic research.

"The only real competition for domination of the planet are the viruses," he said in 1989. "We've beaten everything else, but the viruses are going to be the tough ones."

Dr. Lederberg also warned the public that the world, in becoming more interconnected, held dangers that previous generations had not seen. The 2003 outbreak of severe acute respiratory syndrome (SARS) in China, which quickly spread to Canada, was an example.

"The world is just one village. Our tolerance of disease in any place is at our own peril," he once said.

He received the National Medal of Science in 1989. In 2006, President Bush awarded him the Presidential Medal of Freedom.

Dr. Lederberg was born in Montclair, N.J., on May 23, 1925, and was raised in New York City. He was the son of an Orthodox

rabbi and a homemaker descended from a long line of rabbinical scholars. His early interest in science was whetted by library reading. He was inspired by Paul de Kruif's "The Microbe Hunters" (1926), a book that "turned my entire generation toward a career in medical research," he said in papers donated to the National Library of Medicine.

He graduated at the age of 15 from New York's Stuyvesant High School, a public school that specialized in science and technology.

During World War II, while enrolled at Columbia College, he joined the Navy's V-12 training program. He served as a hospital corpsman at the clinical pathology laboratory at St. Albans Naval Hospital on Long Island, N.Y.

After two years at Columbia's medical school, he left to collaborate with Edward L. Tatum at Yale University. Experimenting with the intestinal bacterium *Escherichia coli*, Dr. Lederberg demonstrated that certain strains of bacteria can undergo a sexual stage, in which they mate and exchange genes. This discovery, and the methods used to make it, had far-reaching scientific and medical implications.

Most immediately for Dr. Lederberg, it brought a doctoral degree from Yale in 1947. Only days before his scheduled return to medical school at Columbia, the 22-year-old was offered an assistant professorship in genetics at the University of Wisconsin.

While working at Wisconsin from 1947 to

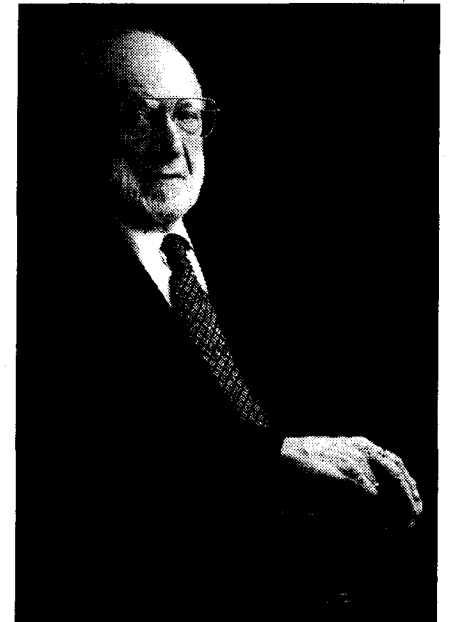
1959, he made another breakthrough. He showed that bacterial genetic material can be exchanged by transduction — when only fragments of chromosomes are transferred from cell to cell. Those bits of genetic material are incorporated into a virus and later become part of the genetic material of infected bacterial cells, thereby altering their makeup and explaining how bacteria of different species could gain resistance to the same antibiotic so quickly.

The Nobel Prize in medicine or physiology came in 1958, while he was the 33-year-old Medical Genetics Department chairman at Wisconsin. The other recipients of the prize that year were Tatum and George Beadle.

Dr. Lederberg had just accepted an offer to become the first chairman of the newly established Department of Genetics at Stanford University's School of Medicine. He moved to Rockefeller University in New York 20 years later and became the school's fifth president. He served there until 1990.

He had been a member of the National Academy of Science since 1957, and he received the Allan Newell Award from the Association for Computing Machinery in 1995 and was elected a director of the Council on Foreign Relations in 1996. He wrote a weekly editorial column on science and society for The Washington Post between 1966 and 1971. He had served on the Pentagon's Defense Science Board since 1979.

He joined a 1985 effort by the American



COURTESY OF ROCKEFELLER UNIVERSITY

Dr. Joshua Lederberg, who helped open up the field of genetics, won a Nobel at age 33.

scientific establishment to improve the technical sophistication of newly elected members of Congress. Nearly all the politicians played hooky, The Post reported.

His marriage to Esther Lederberg ended in divorce.

Survivors include his wife, Dr. Marguerite S. Lederberg of New York City; a daughter from his second marriage, Anne Lederberg of New York City; a stepson, David Kirsch of Chevy Chase; and two grandchildren.